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Toward a Scientific Film History?

David Bordwell and Kristin Thompson

Barry Salt. *Film Style and Technology: History and Analysis*. London: Starword, 1983. 408 pp.

As "New Theory"—that is, Saussurean-Lacanian-Althusserian theory—starts to look older and older, we can expect more alternatives to emerge. One option is to plunge into a study of film history, to test against empirical evidence the claims made by SLA theory. This is certainly one impulse behind Barry Salt's *Film Style and Technology: History and Analysis*, but his ambition goes considerably further. The book is nothing less than an attempt to rewrite the stylistic history of cinema, to set out a comprehensive theory of film analysis and evaluation, and to provide case studies sufficiently detailed to carry his theoretical points. Because we find Salt's project exciting and because we are in sympathy with many of his aims, we have undertaken a detailed analysis of his arguments. The ambitious scale of his undertaking, and its success in many respects, demand a close attention to the critical theory which he proposes and the historical arguments which he sets forth.

Salt states his fundamental commitments forthrightly. He subscribes to "Scientific Realism," the view that "there is a real world, and that this real world is described by the established natural sciences" (p. 1). This realism is both ontological and methodological. First, the real world *is* as the natural sciences describe it. Indeed, Salt's realism consists in "the most tough-minded form of Physicalism" (p. 3). He does not explain this last term, but isolated passages suggest that he takes, for instance, mental states to consist essentially of neurological processes. Salt also embraces a methodological realism in that he wants film studies to adopt methods established in the natural sciences. He emphasizes three methodological principles characteristic of natural science: (1) agreement among practitioners about basic concepts and research procedures; (2) theorizing in terms of causal relationships; and (3) encouraging a continual interaction between theory and observation (pp. 1–2). For Salt, some "human sciences," such as sociology, do not meet these criteria, while others, such as linguistics and psychology, are beginning to do so.

Salt claims that his characterization of Scientific Realism is sufficiently general to accommodate various views in the philosophy of science (Kuhn, Popper, and Lakatos are thinkers whom

he mentions), but certain emphases in his approach push him somewhat close to one version of positivism. Now this term is often carelessly used to designate any theory with an empirical cast, and we do not invoke it in any name-calling spirit. But Salt's insistence on the inevitable imprecision of language and his eagerness to translate stylistic features into statistical terms have strong affinities with the positivist doctrine that science's strongest certainties are those which can be reduced to numbers. We shall return to these points later.

Salt does not expect a "scientific" study of cinema to become as rigorous as natural science. Artworks are characteristically idiosyncratic and unique, and artists often behave contrary to tradition (p. 3). We should not therefore expect the history of cinema to exhibit the universal regularities disclosed by the laws of physics or chemistry. Nonetheless, film scholars can work toward more objective and comprehensive knowledge of the cinema; true scientific thoroughness can be our ideal goal. Our heroes, Salt suggests, should be those historians of art, music, and literature who have sought to place their research upon a scientific footing (p. 3). His examples suggest that he has in mind studies of influences among artists, research on aesthetic preferences, and statistical studies of literary style.

Equipped with these assumptions, Salt pushes forward his project on several fronts. He offers a brief critique of SLA film theory. He argues, even more briefly, for a "practical theory" that will attend to the ways in which filmmakers put films together and that will judge films on objective criteria. The bulk of the book consists of the application of this theory in two domains: the history of style in Europe, Scandinavia, the U.S.S.R., and the U.S.A.; and critical analysis of one director's work—in this case, the films of Max Ophuls. After a discussion of Salt's critique and his proposed theory, we will go on to a more detailed examination of what we take to be the book's crucial claims on the reader's attention, its account of stylistic history.

Scientific Realism and Film Analysis

Salt wheels his version of Scientific Realism into the field and deploys it against big targets. Althusser is criticized for considering as a science any practice with a distinct object, a theory, and a technique (p. 8). Greimas is charged with confusing Klein groups in mathematics with the square of contraries and contradictions of classical logic (pp. 9–10). Metz's *Grande Syntagmatique* is faulted for not noticing that the autonomous shot is functionally equivalent to other syntagmatic types (pp. 13–14) (although Metz does himself grant this[1]), and his explanation of "durative montage" is criticized for misconstruing how such sequences are characteristically put together. Psychoanalysis is attacked for being empirically unreliable, in that psychotherapy cures at the same rate of probability as chance. Lacan is excoriated for empty formulations and a duplicitous use of mathematics and symbolic logic (pp. 17–20). Heath's recasting of the concept of suture is found to be as unhelpfully general as will-of-God explanations in medieval theology (p. 20), and his claims about perspective ignore the genuine optical correspondence which some perspective systems can provide (p. 30). And so on, as Bellour, Eco, and the *Cahiers* editors all wander haplessly into the line of fire. The aim is scattered, and it is not possible in a brief review to trace out every line of attack. Each reader will be persuaded by different points and to different degrees. For our part, we believe Salt's criticism of Bellour to raise important questions about the limits of an "object-centered" structuralism, and his remarks on Lacan to call attention to a deplorable tendency toward pseudoscientific rodomontade in this Surrealist fellow-traveler. On the other hand, Salt seems to

us to oversimplify Eco and to misconstrue Metz and Heath. And Salt's remark that psychotherapy has no curative effect appears irrelevant to its possible value as a means of interpreting artworks. In all, Salt's critique will reassure some readers and infuriate others; he offers some local arguments worth taking seriously, others that need much more substantiation. But the real thrust of the book is not polemical. Salt makes a positive attempt at a new kind of film theory and criticism.

Salt's "practical film theory" seeks a way of analyzing films in terms of the films' construction and their relation to their makers. All causal factors impinging on the film are mediated by "individual filmmakers whose individual differences produce the visible variety of films" (p. 33). Most aspects of a film's style are the result of conscious decisions by individuals (p. 34). But how is the researcher to isolate these aspects? Salt answers by reference to classical film theory's strongest principle: greater or lesser reproduction of "audio-visual reality" (p. 35). Some filmmakers distort reality more than others, or in different ways. This has a very familiar ring, but what distinguishes Salt's view is what we have called his positivism. He goes on to claim that dimensions of fidelity/distortion can be studied "in a semi-quantitative way" (p. 35). Style can be considered as a set of measurable parameters—shot length, number and types of camera setups, number and types of camera movements. Filmmakers can thus be compared on objective grounds, and points of difference and similarity can be spotted. For instance, both Hawks and Hathaway keep the camera at eye level, but Hathaway cuts faster (p. 36). Such quantitative factors can then be explained by appeal to the filmmaker's intended degree of expressive deviation from absolute reproduction.

Furthermore, Salt's theory seeks to supply an objective basis for evaluating films. He sets forth three criteria for a good film: "originality in all respects" (p. 37); the influence which the film has on other films; and the degree to which the finished film fulfills the maker's intentions. These criteria, he insists, "are the most objective possible" (p. 37), but they cannot be applied mechanically: they must be employed with the knowledge of many films, viewed with the sort of analytical skills his theory requires. In effect, Salt argues for historical constraints on evaluative claims. Films must be judged by criteria to which their makers subscribed or could plausibly have subscribed.

Some adherents to SLA theory might be tempted to dismiss Salt's theory out of hand for its "scientific realism," its claims for objectivity, and its search for historically verifiable criteria. We think that this temptation ought to be resisted. Although Salt's argument could be sharper than it is, and although he has a habit of inserting outrageous polemical asides that deflect attention from his main points, his suggestions offer much worth reflecting on. Critical realism, as an alternative to empiricism and conventionalism, is now receiving substantial attention in the philosophy of natural science and social science; recently Robert Allen has proposed it as a basis for film historiography.[2] Moreover, Salt's insistence upon locating a film's difference in relation to the dominant practices of a period strikes a very important note. The study of historically specific norms of filmic representation can enrich our understanding of the range of options available to filmmakers in an era. His demand for precision of description, including statistical representation, comes as a welcome alternative to the practices of a generation of historians who relied upon memory, reviews, and gossip for their evidence. Even the proposed objective criteria should set us thinking about the role that evaluation plays in contemporary criticism. Some textual analysts have deliberately ignored the issue, perhaps assuming that evaluation of any sort was too tainted by sub-

jectivity or traditional aesthetic concerns. Nonetheless, many analysts still operate with tacit criteria that presuppose that, say, Godard-texts are more "productive of meaning" (and hence more worthy of study) than Duvivier-texts. Like intention, evaluation is played down in contemporary film scholarship, and Salt deserves credit for raising such issues in a pointed form.

Still, Salt is better at raising such issues than settling them. Most obviously, his account of form and style seems greatly oversimplified. The "deviation from reality" argument begs the question of what the reality described by Scientific Realism has to do with what we see and hear in the cinema. Salt never defines form, nor explains the form/content dichotomy which he invokes. His research strategy makes style simply a set of isolated technical devices: long takes versus short shots, color versus black and white, and so forth. In its strongest form, this tendency emerges as a purely quantitative one. Salt writes: "The distribution of these qualities (shot lengths, etc.) for a particular filmmaker, when compared with those for other directors working at a certain place and time, gives a sure indication of the existence of a personal style; in fact this is what formal style is" (p. 35). Salt ignores the possibility that a film's style is not simply an aggregate of discretely measurable parameters but rather a *system* in which some parameters are interdependent and some are promoted to a level of salience that others never achieve. One could argue that "the real stylistic distinction" between Hawks and Hathaway lies not in shot length but in the physical deployment of actors and the pacing of their movements (two things that are difficult to quantify). In *His Girl Friday*, for instance, Hawks creates very fast-paced dialogue exchanges which utilize a relatively slow cutting rate; shot length is here subordinated to mise en scène, presumably to facilitate comprehension of the speeches. Measuring shot length as an independent variable reveals nothing about the dominant parameters nor the systematic supporting role played by shot length. Salt has a weaker version of reductionism, however. Here stylistic devices are not strictly quantifiable but rather exist as distinct alternatives available at a historical moment. He does not, for instance, claim to be able to quantify different acting styles or lighting practices. Still, these devices too are completely torn from context, and "analysis" remains only a kind of technique-spotting—what we would call description, and that of a limited sort.

Salt's reluctance to anchor his conception of style within an overall theory of film form leaves him embarrassed on two central concerns of "New Theory": the nature and function of narrative, and the role of the spectator. On the first point, Salt's tactic is discreet avoidance. Narrative is "script-content" (p. 37), and consideration of such problems constitutes a second stage of inquiry, after the stylistic devices have been identified and quantified. But surely the opposite is true: one cannot isolate significant devices without making assumptions about the film's organization, which largely shapes the functions of stylistic elements. In fact, Salt constantly assumes this functionality in his historical and critical positions, and he feels constrained to point out moments when style does not seem to be fulfilling such functions (pp. 108, 109). The point is simply that his *theory* provides no role for narrative (or non-narrative) structure as a concomitant of style. Without such a theory, and bereft of sheerly quantitative concerns, Salt simply falls back on banalities like the claim that Preminger shoots in color and 'Scope because he's more "objective" (p. 37). Where does this leave the color and 'Scope films of Minnelli, Fuller, and Godard?

With regard to the spectator, Salt takes a more direct approach. He calls for research into filmic perception, but he seems to mean by this stimulus-response studies and inquiry into aes-

thetic preferences (p. 30). More curiously, he proposes that "audiences probably understand film in a very simple way. In fact as an intensified and extended dramatic representation—i.e., like a stage play with knobs on" (pp. 34–35). He is using this hypothesis to flog the claims that average spectators notice minor infractions of technical conventions, but it implies a bigger and more damaging concession on his part. Given his hypothesis, who is to say that ordinary audiences notice style at all? And if they don't, why should Salt spend so many pages studying it? There are many lines of defense open here. Perhaps there are causes—psychological, aesthetic, social—for audiences' failure to notice style; perhaps audiences register stylistic patterns unawares; perhaps we don't even know what we mean by "noticing" or "registering." Interestingly, Salt takes none of these lines of defense. By eliminating the study of the spectator at the outset, he simply ignores any gap between pertinent stylistic features—pertinent because noticeable, significant, or whatever—and trivial features distinguishable only to connoisseurs at the editing table. We do not have a simple answer to the problem of perceptibility. Salt might respond that it is a "qualitative" matter and hence subjective; but one could discuss such matters objectively, within the framework of a theory that explicitly addresses the relation of technical devices to larger formal systems (e.g., narrative) and that treats the spectator as creating order on the basis of more or less pertinent cues and constraints.

Salt's "practical" theory is equally vulnerable in its account of evaluation. Few people would quarrel with originality as one good-making feature of artworks, all other things being equal; but the criterion becomes problematic within Salt's quantitative frame of reference. If the average shot length (ASL) of most films is ten seconds, and you make a film which is in all respects comparable to the norm except for having a 20-second ASL, your film is more original and, to some degree, better than the average. This conclusion is intuitively implausible. At the other extreme, purely quantitative difference cannot distinguish originality from sheer weirdness. As for Salt's second criterion, that of influence, art historians have long distinguished between good artworks and influential ones. *Intolerance* may be good and influential; *Only Angels Have Wings* may be good but not influential; *Broadway Melody* may be influential but not good. Salt does not face the difficulties of making influence a good-making property. Salt's third criterion is the degree to which the filmmaker has fulfilled his or her intentions in the finished film. Now many readers will grind their teeth over this, as we did, but we must admit that many current rejections of the relevance of artists' intentions are based on no more than undergraduate hearsay about the Intentional Fallacy arguments advanced by Beardsley and Wimsatt, and today these arguments look fairly insubstantial. We know of no sustained argument in film studies for the irrelevance or indeterminacy of intention. So, despite our belief that an appeal to intention is theoretically weak as a justification of analytical or evaluative claims, we will not argue against it here. There is of course the empirical problem of identifying an intention independent of the film itself, but Salt is confident that it can be done "by taking a little trouble" (p. 37).

Salt wants his three criteria to work together, but this poses intriguing problems. Suppose we have a filmmaker who fully intends to make a film that is as orthodox as possible, and the resulting film is fully ordinary. The filmmaker has scored low on originality but high on fulfillment of intentions. We would in fact have to rate this work more highly than that of a filmmaker who produced an equally insipid film but who intended to make one that was innovative. This

seems absurd: two equally banal films would seem to be equally bad, regardless of intentions. Or consider the postwar work of Ozu and Mizoguchi. True, the directors' respective styles were highly original, but Salt would count their overall consistency against them: "I consider unvaried repetition of a style once established to lessen the value of any filmmaker's work" (p. 375). Moreover, these films had virtually no influence, at least in Salt's sense. If Salt replies that Wenders has recently claimed to be influenced by Ozu, he is in the odd position of saying that "objectively" *Late Spring* got better the moment that Wenders declared that he was influenced. Finally, Salt remarks that the criterion of influence in other films should also be weighted "according to the excellence, by these criteria, of the films that are influenced by the film in question" (p. 37). Apart from inviting an infinite regress, this proviso creates a bizarre situation. If A makes a bad film that inspires B to make a good film, A's film becomes better, and if B's film influences C to make a still better film, both A's and B's works improve.

These difficulties surface very soon in Salt's discussion of Ophuls, which constitutes the last chapter of the book. This is called a stylistic analysis, but it consists of a chronological film-by-film account in which quantitative results (average shot length, number and types of camera movement, proportion of long shots to other sorts) are mixed with fairly casual comments on acting, set design, character types, and biographical facts (the films' despair "can be related to the bad heart Ophuls suffered from in the latter part of his life"). *Liebelei* and *Letter from an Unknown Woman* are discussed segment by segment, but here the approach is simply to count the number and types of shots in each scene and correlate them in an intuitive way with "script-content": cutting speeds up for tense scenes, slows down for relaxed ones. The reader who wants to know what makes Ophuls's style distinct from that of other directors who use long takes with camera movement will learn only that Minnelli's *Madame Bovary* is different from *Letter* because the latter tends to pan while tracking while the former more commonly tracks in or out. If this difference has any functional significance, Salt does not reveal it. The only major discovery which Salt makes is that Ophuls's films utilize more long shots than are usual in the cinema of his period, but once more the pertinence of this information is not discussed. Neither narrative structure nor spectatorial activity is considered.

Salt concludes his Ophuls discussion with an attempt to illustrate the usefulness of his evaluative criteria, and the results are thin. Some Ophuls films fall within the quantitative norms of their period; others, like *La Signora di Tutti* and the post-1950 films, deviate from the norms and are thus judged more original. His later French films are said to have influenced Demy and Godard. Salt also assumes, on shaky grounds, that before 1950 Ophuls intended to avoid alienating the audience and afterward he cared little about commercial success. Thus *La Ronde*, *Le Plaisir*, *Madame de . . .* , and *Lola Montes* rate very highly on all of Salt's criteria. But Salt confuses his presentation by dotting it with many evaluative comments that proceed from other criteria. A performance is "forced and unconvincing" (criterion of realism, p. 371); a parody is "crude" (criterion of subtlety, p. 364); an actor is "lacking in force" (criterion of expressive effect, p. 365); and scripts are said to be poorly constructed (criterion of unity, p. 363). He concludes with the remarkable judgment that Ophuls's themes, motifs, and forms "do not really integrate with each other, and only in some of his films do some of them integrate properly with the story" (p. 376). Salt's technique-spotting has constructed its ideal object—films that utilize stylistic devices as superficial touches.

Historical Arguments

Even readers unmoved by Salt's critique, his theory, and his discussion of Ophuls—even, perhaps, adherents of SLA theory—will be drawn to his history of style and technology. One can foresee the book used as a reference work for answering questions about how Fresnel lenses affect arc lighting, or when the first jump cut was used. The book indeed deserves recognition as the most comprehensive and detailed scrutiny of international trends in film style yet attempted. Salt discusses films from many countries and from the very beginning of cinema. Every reader will learn something from his discussion of silent cinema. Here he produces not only new information but specific arguments that will be fresh to readers who have not followed debates in the field of early-cinema studies. He argues against the traditional image of Edwin S. Porter as the introducer of cutting within the scene, and he offers much evidence that Griffith was far from a thorough innovator—that in several respects his work was rather old-fashioned (pp. 89ff, 126ff). Ralph Ince and Reginald Barker emerge as important and interesting directors. For later periods, Salt offers solid explanations of color processes and certain lighting equipment. The excellent illustrations, well-produced and nearly all heretofore unseen, document his points clearly. In general, Salt's work will encourage people to look more closely at stylistic devices, to appreciate the resourcefulness of "primitive" and early classical filmmaking, and to reflect upon the relation of technology to film style. Although we have many points of disagreement with Salt, we share his goal of close historical study of stylistic trends. It is because we consider that he set himself an important task that we want to examine his results closely and raise questions about method, argumentation, and conclusions.

Let us accept the nature of the project and start with empirical matters. Salt utilizes two sources of data: films and print sources. He claims his sample of films to consist of several thousand films spanning the years 1895–1970. Fairly late in the book Salt qualifies this: "Most of the figures for Average Shot Length and percentages of reverse-angle cuts are taken for [*sic*] thirty to forty minute sections of the films in question" (p. 255). He insists that on statistical grounds "a thirty minute sample gives an adequate characterization of films as a whole," at least those after the 1920s (p. 255). This assumption seems at least questionable. Checking ten of Salt's examples, we found that in seven cases, the ASL (Average Shot Length) figure which he derived from a portion of the film was within a second of the figure derived from the whole film. But in three cases, it was not, and in two of those it was off by several seconds.[3] The two flagrant cases are Stahl's *Back Street* (1932), whose ASL Salt computes at 23 seconds and which we compute at 19 seconds; and *The Letter* (1940), whose ASL Salt claims to be 18 seconds and which we compute to be 13.3 seconds. These are not minor disparities, for in Salt's scheme, only two seconds separate the ASL of the period 1928–1933 (9 seconds) from that of 1934–1939 (11 seconds). If this 30 percent rate of error holds across Salt's entire sample, some of his broader conclusions become far less certain.

Much more startling results arise from Salt's discussion of Soviet cinema. Of the seven films which he lists, we have calculated the ASLs of five on the basis of the total number of shots in the film. For all five films, Salt's figures are significantly inaccurate.[4] Moreover, on the strength of his data Salt claims that American films of the late 1920s were the fastest-cut of any in the world, citing Hollywood films having ASLs ranging from 3.5 to 6.5 seconds (p. 213). But a survey of twenty-two entire Soviet montage films of the years 1925–1933 shows that they average between two and four seconds per shot, with some having shot lengths of less than two sec-

onds.[5] It seems that Salt's method of sampling only chunks of films often leads him to overestimate a film's ASL. It would be interesting to know whether his calculations of shot/reverse-shot percentages and the percentage of shot types are as open to challenge as are his ASL figures.

Salt has also derived information on style and technology from print sources, principally the *Journal of the Society of Motion Picture and Television Engineers* (1916–1970) and *American Cinematographer* (1921–1970). These seem to us inadequate for comprehensive historical research. There are a great many technical and trade journals available to the historian of film technology, and reliance on only two can lead to incomplete and inaccurate inferences. (We shall mention some instances below.) Perhaps more serious is the book's total absence of footnotes or specific references. "Nothing is to be gained," writes Salt, "by giving precise references to the line in a trade journal where I picked up an isolated scrap of information" (p. 380). It is hard to say whether this is more ingenuous or evasive. What is gained by footnotes is the reader's ability to test one's claims, to distinguish documented assertions from inferences, and to go on to pursue avenues of inquiry that might be quite different from those of the author. Salt's assertions rest finally on an appeal to his authority as someone who has waded through hundreds of films, the two most obvious technical journals, and some books. As a rhetorical strategy, this seems incompatible with Scientific Realism, which in his own formulation requires a standard for "the general way research should be carried on." Citation of sources is, inevitably, part of the standard of serious historical research.

In examining the details of Salt's treatment of film history we shall concentrate on the silent era—partly because about half of the entire book is devoted to this period and partly because most people have less knowledge of this era and will tend to rely most heavily upon this part of Salt's book.

Salt has been a major force in the revival of interest in early cinema, and especially in its stylistic changes. He has bothered to scrutinize the film frame more minutely than anyone had done previously, and his resulting discoveries about early lighting techniques, special effects, and the like are extremely valuable. His techniques have influenced other researchers in this area. He was perhaps the first to conclude that the classical cinema's techniques were largely in place as early as 1917, and other authors, including ourselves, have found that date to be accurate.

Given the importance of this work, one might hope to turn to *Film Style and Technology* as a dependable source of information. Unfortunately, the book is dotted with inaccurate dates, omissions, and misleading statements. Salt claims in his preface that he will be looking at technical developments "that might have some connection with stylistic developments." Shortly thereafter, he states that scientific realism will dictate strict cause-effect reasoning. We might then expect to find the organization within chapters reflecting the chronological cause-and-effect relationships between technological change and style. This would seem to provide Salt with a guide for saliency, since he will presumably discuss only those technological innovations which had an effect on style, and he will be able to demonstrate why those changes took place when they did.

But the book does not carry through consistently on these intentions. Salt sometimes mentions new technology without giving a hint as to what, if any, effects the device would have on style. The description of the early Pathé camera (p. 68) does not suggest what new options it might offer the filmmaker. Salt has no overarching argument which might see innovations and their effects on style as systematic, or as respond-

ing to pressures within the film industry. Hence there is no logical progression among parts of the chapters. Instead, each chapter consists of a series of short subsections on various topics; at one point he moves from dialogue titles to the Pathé staircase (a set often used in early Pathé films), and then to the Pathé camera (pp. 67–70). In combination with the breakdown of the chapters themselves by years, this approach makes it difficult, sometimes impossible, to trace the causality underlying a technical or stylistic trend. For example, if one reads all the separate sections on the introduction of panchromatic film stock at once, one still has no sense of *why* panchromatic came in so late and why it was widely adopted at a given time. All one ends up with is a sketchy chronology of its slow progress.

Such an organization makes it easy to conceal omissions, since the reader is likely to take each subsection as a discrete unit and to fail to notice between chapters that an important bit of material has been left out. For example, in his discussion of lighting equipment in the teens (pp. 132–136), Salt fails to mention the concept of actinicity (the proportion of the light which actually registers as an image on a given film stock). This concept is important in explaining why the clumsy mercury-vapor lamp retained a prominent place in studio lighting well into the 1920s. (For orthochromatic film stock, its greenish light was the most actinic compared to other available types of lamps.) Salt does mention actinicity in a later discussion of lighting in relation to orthochromatic and panchromatic stocks (p. 223), but only to dismiss all contemporary published statements on the subject as "propaganda." Possibly some articles in *American Cinematographer* and other journals were designed to encourage studios to buy certain types of lamps. But other articles are fully as scientific as Salt could desire. *The Illuminating Engineer* and *American Cinematographer* both published articles with spectrum analysis charts and other technical material.[6] Such apparently reliable sources need more attention than the casual and unsupported blanket condemnation Salt affords them. This sort of claim seems aimed at allowing him to dispense with conventional written sources and footnotes. (If actinicity made no difference, as Salt asserts, why did the studios not adopt incandescent lighting beginning in 1913, when the drawn-tungsten filament was introduced? Such lamps would be far more efficient to use in terms of time and labor, as Salt points out, and he has to resort to blaming the failure to adopt them on the cinematographers' ignorance.) Other omissions include pre-1926 projection technology; for some reason, Salt talks about projectors for the first time in his section on the 1926–1929 period, with no explanation as to why he has ignored them to this point. (Certainly there is a great deal of information available on early projection.) One of the most important omissions is the perforator which Bell & Howell introduced in 1907; this machine was crucial in the standardization of perforation size and shape, and hence many of the lesser innovations upon which Salt dwells actually depended on it.

In general, Salt's treatment is considerably biased toward American film. Although *Film Style and Technology* claims to be a world history, its treatment of French, German, British, Soviet, and other national cinemas is quite sketchy; the coverage of technological change in these countries is particularly spotty. Only for the first two decades of cinema history can his treatment be considered truly international.

Salt treats the material he does include with utter confidence, making sweeping generalizations as if they were absolutes. He claims that "Up to and including this date [1910] dialogue titles were never cut into the middle of the shot at the point at which the character in the film was actually speaking them" (p. 121). This is very nearly true, no doubt, but *The Unexpected Guest* (Lubin, 1909) does have a dialogue title in the

middle of a shot, and there are probably others. Since most silent films do not survive, such a generalization is risky. It would be safer to use phrases like "In all the examples I saw" or "Seemingly." Salt, however, consistently uses diction which makes him sound far more sure of his claims than anyone could be under the circumstances.

This problem is exacerbated in cases where Salt tries, by examining the films themselves, to find things which he could actually learn only from print sources. Because he largely avoids print sources, he sometimes dates the introduction of technical devices too late. For example, he dates the introduction of the sunlight arc spotlight as 1919, without giving any source; but contemporary advertisements and articles make it clear that the arc became available to the industry in February 1918, and later sources give that date as well.[7] Again, Salt claims that the Bell & Howell all-metal studio camera (which became the industry standard by the twenties) was not introduced until 1912 and that he could find "no definite mention of any cameraman acquiring one before 1914." "Definite mention" is rather vague, but both Earl Theisen's and W. Wallace Clendenin's very reliable historical accounts date the model as starting to be manufactured in 1909; they and other sources indicate that Essanay bought the first one at about that time; Kalem apparently took the second one before 1912.[8] A few other representative errors of this type: the Akeley camera was more important in studio filmmaking than Salt allows (p. 201); he says that "by 1926" Kodak was marketing a set of diffusion filters—seeming to suggest that this was the first such usage—yet Karl Brown refers to such filters in *American Cinematographer* in 1922. (This latter point is part of a general tendency on Salt's part to date the soft style of cinematography too late.) He claims that "all the significant information that can be found in the journals about the history of the Mitchell camera could be written down in a few lines" (p. 378). Yet the historical articles in *The International Photographer* cited earlier, or the contemporary trade press (which did cover technological innovations), or cinematography manuals of the period give a considerable amount of information on Mitchells.[9] These instances may seem trivial individually (although most did have distinct effects on film style). Yet we suspect that many readers, while dismissing the theoretical tirades of the first few chapters, will accept Salt's assumption that he can provide objective, correct data. Occasional inaccuracies inevitably creep into a book of this size and ambition. If the author makes a strong overall argument and the bulk of the evidence is accurate, such local inaccuracies may not substantially affect the argument. Salt's basic argument, however, is precisely that objective accuracy constitutes the historian's goal, and hence even a few mistakes will stand out disproportionately. Moreover, his inaccuracies arise from a consistent and pervasive cause—the lack of print sources.

In condemning such sources as unreliable, Salt cites primarily Fred Balshofer and Arthur C. Miller's *One Reel a Week* (University of California Press, 1967). Assuredly a book published 57 years after the 1910 inaccuracy he singles out would be a suspect source—and most historians would consider it so. Yet this is hardly typical of the material available on the silent era, and it is part of the historian's job to judge the varying degrees of reliability in his/her sources according to reasonably objective criteria. In general, Salt ends by fostering the myth that little contemporary information survives on silent films, and that the little that we do have is largely unreliable.

Salt is at his best when he can back up his claims by examining the films themselves. But even here some lapses occur. In spite of his promise to make strict cause-effect links, Salt often ignores them. For example, he claims that for filmmakers of 1900–1906 the issue of how to

make longer films which would be comprehensible to the audience was a "crude problem," while the challenge posed by action continuity in cutting was "the major problem" (p. 51). Yet these two problems seem inextricably linked causally, since longer narratives were one important factor which led to more cutting in films, and action continuity was primarily important in cutting because it helped keep the lengthier narratives comprehensible. Similarly, in his discussion of German silent films, Salt argues that a slow cutting pace "was reinforced by the slow pace of their narratives and acting" (p. 213)—as though a long Average Shot Length was the goal and the other factors merely the means to achieve it. (This reversal of cause and effect results, again, from a lack of any concept of function which could determine stylistic priorities.)

A few passages will seem quite opaque to the nonspecialist reader, as when Salt casually mentions the "fading shutter" as a possible reason why D. W. Griffith kept using irises into the twenties, when most filmmakers had opted for fades and dissolves. Billy Bitzer's continued use of the older Pathé camera, he contends, would suggest that he did not have a fading shutter. Salt does not, however, explain what a fading shutter is. The automatic fading shutter was a camera device apparently introduced in 1918; for the first time, it allowed the camera operator to close down the shutter opening while the camera was running, thus achieving a smooth, complete fade. Previously fades had to be made by closing down the diaphragm, which did not shut completely and thus left a small open circle in the middle. (Camera operators completed fades by putting their hands over the lenses.) Given this crude technology for fade-making, filmmakers presumably opted for irises more often in the pre-1919 period. Salt does not go on to make the obvious causal connection between the introduction of the automatic fading shutter and the decline in the use of irises after 1919 (though he does corrrectly date the peak period of their use as 1914–1919). Nor does he point out that the new type of shutter was sold both in new cameras and as an attachment for existing ones; the Badgley shutter had been put into "dozens" of Pathés by early 1919, according to the *Transactions of the Society of Motion Picture Engineers*.[10] Had Bitzer wanted one for his Pathé, he could have acquired one, and possibly he did. The shutter as such is thus not adequate reason for Griffith's continued use of irises.

Finally, some of Salt's claims are downright strange. He says, for example, that the camera movements in L'Herbier's 1928 *L'Argent* improve (that is, become "less conspicuous") in the course of the film because the three cinematographers and the director learned how to execute them more skillfully in the course of the production (p. 228). Yet *L'Argent* was presumably shot out of continuity, as are most films, and it seems highly unlikely that the camera movements that appear late in the film were all shot later during the production. (Aside from this, some of the film's most original—and hence, by Salt's own criterion, good—camera movements occur early on, as with the remarkable arcing track approximately 300° around Massias as he studies the map on the wall of the circular room.)

More general questions are raised by Salt's accounts as well. He offers no overarching argument about the history of film style; he makes no claims about its directions, patterns of transformation, or significant ruptures. The book in fact works against such a broad argument by its piecemeal breakdown of each chapter into miscellaneous topics. This obviously promotes the atomistic treatment of technique we have already noted. Salt's chronology of inventions, innovations, and changes typically provides not explanations but descriptions. This is in keeping with his definition of Scientific Realism as holding that the real world is "described" by the natural sciences. But most advocates of critical

realism state firmly that a science produces not only descriptions but explanations.[11]

Lacking a position on the overall history of film style makes periodization arbitrary. Salt breaks the history of silent cinema into phases that are not intuitively obvious: 1895–1900, 1900–1906, 1907–1913, 1914–1919, 1920–1926, 1926–1929. His rationales for such groupings are sketchy, often deriving from production or exhibition circumstances rather than any clear stylistic or technological changes. After the silent era, Salt opts for familiar but unargued-for decade slots: the 1930s, the 1940s, and so on. In general, Salt has not faced the problem of constructing a period scheme for the historical phenomena he wishes to consider—i.e., style and technology. Nor does the format allow him to construct a coherent synchronic picture of the filmmaking resources available at a given moment, for the topical disquisitions that compose each chapter do not connect in ways that show the relation between, say, lighting and editing in a given period. Here periods function simply as bins for sorting different pieces of information.

Although Salt's account lacks explicit unifying arguments, it does not lack assumptions. Two of them seem to us important.

1. Salt explicitly presupposes an evolutionary model of film style. "Novel features which suddenly appear like mutations are sometimes rapidly taken up, forming a line of descent, while on other occasions original devices die out because they have some unsuitability of a technical or artistic nature" (p. 51). Less explicitly, Salt's evolutionary model presumes a teleology. Films are "advanced" or "retarded," and the better directors tend to "get there first" (p. 208). The evolutionary goal, Salt thinks, is the classical continuity cinema of the sound period. It is not just that he concentrates on many stylistic devices that have traditionally been regarded as contributing to the development of the classical style, such as crosscutting and shot/reverse shot; one can hardly ignore them. Rather, Salt seems to accept as entirely natural that the cinema would have evolved toward the classical norm. He calls the long-shot/medium-shot/close-up editing pattern "scene dissection," presuming as Hollywood does, that the scenographic space preexists the act of cutting it up. (Compare the Soviet montage directors' notion of "spatial construction" in editing.) So strong is this tendency that Salt can call *Ballet méchanique* "a film composed entirely of Inserts" (p. 219). Salt "naturalizes" the eyeline match in an equally traditional way, suggesting that obedience to the 180-degree rule results in something "rather like what a spectator before the actual scene would see, standing there and casting his glance from this point to that point within it" (p. 164). This line of thinking goes back very far and finds its most influential formulation in Pudovkin's *Film Technique* (1926). Again, the teleological implication is not developed at a broad level of argument, but it underlies choices about the material included and how it is discussed. (For example, discontinuous aspects of Soviet montage are given cursory treatment.) Needless to say, the evolutionary-teleological assumption is open to the criticism that styles, unlike biological organisms, are not inherently well- or poorly equipped to survive; a style's environment is social, and its perpetuation depends upon individual and institutional activities, not genetic adaptability.

2. Very often Salt provides no causal accounts at all, only the descriptive lists we have already mentioned. When causality is invoked, the prime movers are two. First, an impersonal technology pushes ahead. "X was introduced" is Salt's most common formulation, the syntax suggesting a machinery of innovation operating outside the ken of human agents: historical change in the passive voice. Perhaps this is the source of his tendency to get caught up in describing every technical process, regardless of its stylistic con-

sequences. Secondly, Salt poses the individual artist as innovator. (The clearest instance is probably the discussion of Gregg Toland, pp. 259, 263, 294–297.) Ignoring the context of film production, Salt concentrates on how particular artists solved technical problems of their times. When innovations involve several individuals, Salt invokes notions of influence, trends, and fashions. Such informal processes are undeniably present in film history, but elsewhere we and a collaborator have argued for a more institutional approach, whereby individual innovation occurs within a larger sphere of priorities and favored problems, that matrix of aesthetic and economic protocols constructed by the mode of film production.[12] To decide between the two explanatory frameworks, one would have to compare them for coherence and richness of internal articulation and for "coverage" of external data.

To sum up: Salt's method of sampling films and his selective use of print sources vitiate many of his conclusions. His scoffing disregard of footnotes is inconsistent with Scientific Realism's putative demand for a shared and rigorous scholarly method. His refusal of any overall historical arguments has several consequences: a scrappy assemblage of information, some of it inaccurate and incomplete; a tendency toward unmotivated descriptions of isolated technological innovations; and a periodization that can only seem capricious. His evolutionary assumptions, if straightforwardly defended, could provide the lacking frame of reference, but these, like his assumptions about the impersonality of technological innovation and the centrality of the individual filmmaker, emerge only as side remarks, not systematic, argued-out theoretical views. To some extent, these features of his history echo aspects of his critical method. An aesthetic of connoisseurship and technique-spotting may find its parallel in the notion of history as a set of discrete facts, many very obscure, set out for the delectation of the expert.

In the light of our criticisms, the reader may be surprised to find us still endorsing Salt's project. Despite our objections, Salt deserves praise for his challenge to the complacencies of contemporary theorizing, his commitment to extensive viewing and intensive scrutiny, and his obvious passion for cinema. SLA theorists may insist that they have the correct solutions, but that is often because they have let abstract theoretical systems outside the realm of cinema formulate the problems. Salt starts with films, and even if one quarrels with many of his answers, as we do, he should encourage us to ask questions that address particular formal and material qualities—indeed, *aesthetic* qualities—of cinema.

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NOTES

1. See Christian Metz, *Film Language*, trans. Michael Taylor (New York: Oxford University Press, 1974), 133n.

2. See Frederick Suppe, "Afterword—1977," in Suppe, ed., *The Structure of Scientific Theories* (Urbana: University of Illinois Press, 1977), 716–728; Russell Keat and John Urry, *Social Theory as Science* (London: Routledge and Kegan Paul, 1975), 27–45; Robert C. Allen and Douglas Gomery, *Film History: Theory and Practice* (New York: Knopf, 1985), 13–21.

3. Here is a comparative listing of Salt's ASL computations and ours (in seconds):

	Salt ASL	Our ASL
Back Street (1932)	23	19
Magnificent Obsession (1935)	26	25
Sylvia Scarlett (1935)	10	10.6
The Grapes of Wrath (1940)	10	10.5
The Letter (1940)	18	13.3
Citizen Kane (1941)	12	12
Dive Bomber (1941)	7	7
Passage to Marseille (1944)	7	7.8
The Big Sleep (1946)	12	12
Night and Day (1946)	9	11

Some of these figures, not reported in *Film Style and Technology: History and Analysis*, are derived from Salt's article, "Statistical Style Analysis of Motion Pictures," *Film Quarterly* 28, 1 (Fall 1974): 17.

4. Here is a comparative listing of Salt's ASL computations and ours (in seconds):

	Salt ASL	Our ASL
Mr. West in the Land of the Bolsheviks (1924)	6.0	4.3
Potemkin (1925)	4.0	1.9
By the Law (1926)	6.5	4.2
The House on Trubnoi Square (1928)	4.0	3.0
The New Babylon (1929)	5.0	3.7

5. See David Bordwell, *Narration in the Fiction Film* (Madison: University of Wisconsin Press, 1985), 238–239.

6. William A.D. Evans, "The Artificial Lighting of Moving Picture Studios," *The Illuminating Engineer* (June 1915): 284–288; Dr. Alfred B. Hitchins, "Artificial Lighting of Motion Picture Studios," *American Cinematographer* 3, 6 (September 1922): 14, 21–22.

7. Advertisement for "Sun-Light" Arc, back cover, *Cinema News* 2, 3 (February 1918); J. Justice Hamer, "Artificial Sunlight," *Cinema News* 2, 3: 9; Harry D. Brown, "The Evolution of Studio Lighting," *American Cinematographer* 6, 10 (January 1926): 13; Earl Theisen, "Part of the Story of Lighting," *International Photographer* 6, 3 (April 1934): 12.

8. Earl Theisen, "The Story of Bell & Howell," *International Photographer* 5, 9 (October 1933): 24; W. Wallace Clendenin, "Cameras of Yesteryear, Part III," *International Photographer* 21, 3 (March 1949): 17; Donald J. Bell, "A Letter from Donald Bell," *International Photographer* 2, 2 (February 1930): 19.

9. For sources on these topics, see David Bordwell, Janet Staiger, and Kristin Thompson, *The Classical Hollywood Cinema: Film Style and Mode of Production to 1960* (New York: Columbia University Press, 1985).

10. Homer Croy, *How Motion Pictures Are Made* (New York: Harper and Brothers, 1918), 176–177; Carl L. Gregory and G.J. Badgley, "Attachments to Professional Cinematographic Cameras," *Transactions of the Society of Motion Picture Engineers*, no. 8 (14–16 April 1919): 80–82. Lest anyone assume that the latter article is just advertisement for the Badgley shutter, we point out that other brand names are mentioned as well.

11. See Keat and Urry, *Social Theory as Science*, 28–32; Allen and Gomery, *Film History*, 14–16.

12. See Bordwell, Staiger, and Thompson, *Classical Hollywood Cinema*, 243–261.